**Sample Space and Tree Diagrams**

Outcome = a possible result of an event

Ex: The outcomes of flipping a coin are heads and tails.

The outcomes of a flipping a coin twice and heads-heads, heads-tails, tails-heads

Sample Space = the set of all possible outcome of an event

Event = the thing that we’re finding the probability of

*Ex*: The sample space for flipping a coin is {heads, tails}

The sample space for flipping a coin twice is {heads-heads, heads-tails, tails-heads, tails-tails]

Using the sample space can help us to figure out the total possible outcomes for an event (or multiple events).

*Ex*: You have a green shirt, a yellow shirt, and an orange shirt. You have a pair of jeans and a pair of khaki pants. How many possible outfits do you have?

The sample space (possible outcomes for putting together an outfit) is:

{green shirt-jeans, green shirt – khakis, yellow shirt-jeans, yellow shirt – khakis, orange shirt-jeans, orange shirt-khakis)

There are 6 possible outcomes for choosing an outfit.

Sometimes it’s difficult to determine the sample space when there are many choices, so we use a tree diagram to show the sample space in a more organized way.

Tree Diagram = a diagram that shows all possible outcomes of an event (sample space)

To create a tree diagram, we start with one choice. From the example above, we can either start with shirts or pants. I will show both ways below and you will see that we get the same sample space, regardless of which event we start with.

Here’s the first way, starting with choosing a shirt first:

Each possible outcome gets it’s own “branch” on the tree diagram.

Orange Shirt

Green Shirt

Yellow shirt

Then, we move to the next choice – pants:

We draw 2 more branches (one for each outcome – jeans or khakis) from the ends of our existing branches.

Orange Shirt

Green Shirt

Yellow shirt

Khakis

Jeans

Khakis

Khakis

Jeans

Jeans

When we count the ends of our final set of branches, we get the number of outcomes in our sample space (6).

If we follow each branch from start to finish, we get the list of outcomes in our sample space.

Yellow Shirt – Jeans

Yellow Shirt – Khakis

Green Shirt – Jeans

Green Shirt – Khakis

Orange Shirt – Jeans

Orange Shirt -KhakisName: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_

**Sample Space and Tree Diagrams – Regents Problems!**

A restaurant sells kids’ meals consisting of one main course, one side dish, and one drink, as shown in the table below.

Kids’ Meal Choices

|  |  |  |
| --- | --- | --- |
| **Main Course** | **Side Dish** | **Drink** |
| Hamburger | French Fries | Milk |
| Chicken Nuggets | Applesauce | Juice |
| Turkey Sandwich |  | Soda |

Draw a tree diagram or list the sample space showing all possible kids’ meals. How many different kids’ meals can a person order?

José does not drink juice. Determine the number of different kids’ meals that do not include juice.

José’s sister will eat only chicken nuggets for her main course. Determine the number of different kids’ meals that include chicken nuggets.

The Grimaldis have three children born in different years. Draw a tree diagram or list a sample space to show all the possible arrangements of boy and girl children in the Grimaldi family.

If Laquisha can enter school by any one of three doors and the school has two staircases to the second floor, in how many different ways can Laquisha reach a room on the second floor? Justify your answer by drawing a tree diagram or listing a sample space.

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Sample Space and Tree Diagrams – Practice Problems**

Kimberly has three pair of pants: one black, one red, and one tan. She also has four shirts: one pink, one white, one yellow, and one green. Draw a tree diagram or list the sample space showing all possible outfits that she could wear, if an outfit consists of one pair of pants and one shirt. How many different outfits can Kimberly wear?

Samuel is buying a new car. He wants either a convertible or a hatchback. Both types of cars are available in red, white, or blue and with automatic or standard transmission. Draw a tree diagram or list a sample space of all possible choices of cars that are available.